The invention in which an exclusive right is claimed is defined by the following:

1. A system for obtaining at least one output signal corresponding to at least one image of an object that is formed along an inclined focal plane passing through the object, wherein there is relative motion between the object and the system, comprising:

(a) a time delay integration (TDI) detector disposed to receive light from the object along an imaging path, forming said at least one image of the object on a plane of said TDI detector that is inclined at an angle relative to the imaging path, so that the plane of the TDI detector is not perpendicular to the imaging path, said angle determining an angle of the inclined focal plane; and

(b) an optical element disposed between the object and the TDI detector and oriented so that light traveling from the object is directed along the imaging path to form said at least one image of the object on the plane of the TDI detector, in response thereto, said TDI detector producing one of:

(i) an output signal corresponding to an image of the object relative to the inclined focal plane, said output signal being a composite of the light from the object at differing focal positions within the object, taken along the inclined focal plane, and being indicative of at least one characteristic of the object at the differing focal positions; and

(ii) a plurality of output signals, each output signal corresponding to an image of the object formed on the plane of the TDI detector relative to a different focal position along the inclined focal plane, said plurality of output signals being indicative of at least one characteristic of the object at different focal positions within the object, along the inclined focal plane.

2. The system of Claim 1, wherein the TDI detector comprises one of a charge-coupled device, a complementary metal oxide semiconductor, and a multi-channel plate imaging device.

3. The system of Claim 1, wherein the TDI detector comprises a plurality of light-sensitive pixels that produce a pixilated output signal.

4. The system of Claim 3, wherein the plurality of light-sensitive pixels are generally arranged in a quadrilateral array in the plane of said TDI detector.

5. The system of Claim 4, wherein the output signal is read from one of a row and a column of the quadrilateral array.

6. The system of Claim 1, wherein the output signal propagates over the TDI detector with a velocity and in a direction determined by the relative motion between the object and the system.

7. The system of Claim 1, wherein the output signal propagates over the TDI detector with a velocity that is substantially synchronous with that of a corresponding image of the object formed on the TDI detector.

8. The system of Claim 1, wherein the output signal propagates over the TDI detector with a velocity that is substantially asynchronous with that of a corresponding image of the object formed on the TDI detector.

9. The system of Claim 8, wherein each image of the object is formed on the TDI detector in a time sufficiently short so that the image and the output signal produced in response thereto diverge by less than a pixel of the TDI detector.

10. The system of Claim 1, wherein the plurality of output signals are spaced apart sufficiently over the plane of the TDI detector so that the plurality of output signals do not overlap.

11. The system of Claim 1, wherein a velocity of the output signal propagating over the plane of the TDI detector is synchronous with a velocity of a corresponding image formed on the TDI detector for a portion of the time during

which the output signal propagates and asynchronous with the velocity of the corresponding image for another portion of the time.

12. The system of Claim 1, further comprising a pulsating light source that periodically illuminates the object.

13. The system of Claim 1, wherein the object is entrained in a flowing fluid.

14. The system of Claim 1, wherein one of the object and the system is stationary.

15. The system of Claim 1, wherein both the system and the object are in motion.

16. The system of Claim 1, further comprising one of a shutter and a gate disposed in the image path, said one of the shutter and the gate periodically enabling light from the object to reach the TDI detector.

17. The system of Claim 16, wherein said one of the shutter and the gate is disposed between the TDI detector and the object.

18. The system of Claim 1, further comprising a dispersing element disposed in the image path for dispersing the light into spectral components, said spectral components being indicative of said at least one characteristic of the object.

19. A method for determining at least one characteristic of an object, comprising the steps of:

(a) directing light from the object onto a generally planar surface of a time delay integration (TDI) detector to form an image of the object, said generally planar surface being inclined relative to an axis along which the light from the object is directed onto the TDI detector, said TDI detector producing an output signal corresponding to the image of the object at least at one

point along an inclined focal plane that passes through the object, said inclined focal plane being inclined relative to the planar surface of the TDI detector so that the inclined focal plane intersects the object at different focal points within the object over time; and

(b) reading the output signal from the TDI detector, said output signal being indicative of said at least one characteristic of the object at said at least one focal point within the object.

20. The method of Claim 19, wherein the step of directing the light comprises the step of focusing the light with an optical element disposed between the object and the TDI detector.

21. The method of Claim 19, wherein the step of directing the light comprises the step of dispersing the light from the object into spectral components to form a spectral image of the object on the generally planar surface of the TDI detector.

22. The method of Claim 19, further comprising the step of propagating the output signal over the TDI detector at a defined velocity.

23. The method of Claim 22, wherein there is relative motion between the object and the TDI detector.

24. The method of Claim 23, wherein the output signal is propagated over the TDI detector along a path that is generally aligned with a direction of the relative motion between the object and the TDI detector.

25. The method of Claim 23, wherein the defined velocity of the output signal over the TDI detector is substantially equal to a velocity of the image of the object formed on the TDI detector.

26. The method of Claim 23, further comprising the step of periodically exposing the TDI detector to the light from the object.

27. The method of Claim 26, wherein the output signal is propagated over the TDI detector at a velocity sufficient to prevent a successive image of the object from overlapping the output signal.

28. The method of Claim 19, wherein the step of reading the output signal comprises the step of reading a voltage from one of a row and a column of the TDI detector.

29. The method of Claim 19, wherein said at least one characteristic of the object comprises the step of detecting one of:

(a) a presence of a fluorescence in-situ hybridization (FISH) probe disposed on the object;

(b) a presence of a plurality of FISH probes within the object; and

(c) a location of at least one FISH probe within the object.

30. The method of Claim 19, further comprising the step of determining an intensity of the output signal over time.

31. The method of Claim 19, further comprising the step of forming a composite output signal as the image of the object varies at the different focal points along the inclined focal plane.

32. The method of Claim 19, further comprising the step of producing a plurality of different output signals, each output signal corresponding to a different image of the object at a different focal point along the inclined focal plane, said plurality of different output signals being sufficiently spaced apart over the TDI detector to avoid overlapping each other.

33. A system for obtaining an output signal corresponding to an image of an object and indicative of at least one characteristic of the object, wherein there is relative motion between the object and the system, comprising:

(a) a time delay integration (TDI) detector disposed to receive light from the object along an imaging path, a plane of said TDI detector being inclined at a non-orthogonal angle relative to the imaging path and inclined relative to a direction of the relative motion, said TDI detector producing an output signal that propagates over the TDI detector and corresponds to the image of the object formed on the TDI detector at least at one focal point along an inclined focal plane that passes through the object; and

(b) an optical element disposed between the object and the TDI detector and oriented so that light traveling from the object is directed along the imaging path onto the plane of the TDI detector, forming the image of the object on the TDI detector, said output signal from the TDI detector being indicative of said at least one characteristic of the object at said at least one focal point within the object.

34. The system of Claim 33, wherein image of the object and the output signal propagate over the TDI detector at substantially the same velocity.

35. The system of Claim 34, wherein the output signal comprises a composite output signal corresponding to the image of the object formed on the TDI detector at a varying focal distance defined by the inclined focal plane that passes through the object.

36. The system of Claim 33, wherein the TDI detector produces a plurality of output signals corresponding to a plurality of images of the object formed on the TDI detector, at a plurality of focal points along the inclined focal plane that passes through the object.

37. The system of Claim 36, wherein the plurality of output signals corresponding to a plurality of images of the object are propagated over the TDI detector with a velocity selected such that none of the plurality of output signals overlaps.

38. The system of Claim 36, wherein the plurality of output signals corresponding to a plurality of images of the object define a three-dimensional representation of the object.

39. The system of Claim 33, wherein the TDI detector comprises one of a charge-coupled device, a complementary metal oxide semiconductor, and a multi-channel plate imaging device.

40. The system of Claim 33, wherein the TDI detector comprises a plurality of light-sensitive pixels that produce a pixilated output signal.

41. The system of Claim 39, wherein the plurality of light-sensitive pixels are generally arranged in a quadrilateral array in the plane of said TDI detector.

42. The system of Claim 44, wherein the output signal is read from one of a row and a column of the quadrilateral array.

43. The system of Claim 33, wherein the object is entrained in a flowing fluid.

44. The system of Claim 33, further comprising one of a shutter and a gate disposed in the image path, to periodically enable light from the object to reach the TDI detector.

45. The system of Claim 44, wherein the one of the shutter and the gated image intensifier alternates between blocking the TDI detector from the light and exposing the TDI detector to the light.

46. The system of Claim 33, further comprising a dispersing element disposed in the image path for dispersing the light into spectral components.